Docket 87610AEK
Customer No. 01333

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of

Scott R. Conley, et al

ELECTROLUMINESCENT DEVICE WITH ANTHRACENE DERIVATIVE HOST

Serial No. US 10/809,064

Filed 25 March 2004

Group Art Unit: 1712

Examiner: Timothy J. Kugel

Mail Stop APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Sir:

APPEAL BRIEF PURSUANT TO 37 C.F.R. 41.37 AND 35 U.S.C. 134

Appellants hereby appeal to the Board of Patent Appeals and Interferences from the Examiner's Final Rejection of claims 1,3-6,8-10,12,13,15,17,18,21,24-27 and 30, which was contained in the Office Action mailed December 6, 2006.

A timely Notice of Appeal was filed April 2, 2007.

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Real Party In Interest

Eastman Kodak Company is the real party in interest in this patent application and appeal.

Related Appeals And Interferences

No appeals or interferences are known which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

Status Of The Claims

The status of all claims ever in the case is as follows:

Claims 1,3-6,8-10,12,13,15,17,18,21,24-27 and 30 are appealed.

Claims 2, 7, 11, 14, 16, 19, 20, 22, and 23 are withdrawn.

Claims 28, 29, and 31-33 are canceled.

Status Of Amendments

No amendments were filed after the Final Rejection

Summary of Claimed Subject Matter

Independent Claim 1

With respect to FIG. 1 **(reference character)** and the specification (page/line), the invention of claim 1 is directed to an electroluminescent device comprising a light emitting layer **(109)** (3/15-22) including as a host an anthracene material bearing at least one aryl ring in the 2-position (4/7-9) and having a hydrogen or an alkyl group in the 6-position (4/9-10) and having up to 12 aromatic carbocyclic rings (4/11) including at least one naphthalene group in the 9-position of the anthracene group (4/14-15) and an aryl group in the 10-position (4/16), the anthracene material including among the rings only carbocyclic rings (4/11-12), and including a light emitting material in an amount of up to 15 vol.% of the host (5/9-12).

The data in Tables 1-8 at pages 51-57 demonstrate that the host of the invention bearing an aryl group in the 2-position and meeting the other claim limitations provides a marked improvement in luminance yield, color, and stability compared to the conventional TBADN host bearing an anthracene

nucleus with a t-butyl group in the 2-position and naphthalene groups in the 9- and 10-positions.

Grounds of Rejection to be Reviewed on Appeal

The following issues are presented for review by the Board of Patent Appeals and Interferences:

1. Claims 1,3-6,8-10,12,13,15,17,18,21,24 and 30 are rejected in paragraph 5 of the Final Rejection dated December 6, 2006, under 35 USC 102(b) and/or 35 USC 103(a) as being anticipated or in the alternative as being obvious over US 6,361,887 of Shi.

2. Claims 25-27 are rejected in paragraph 6 of the Final Rejection under 35 USC 103(a) as being obvious over Shi above in view of US Publication 2002/0027416 of Kim.

Arguments

1. Claims 1,3-6,8-10,12,13,15,17,18,21,24 and 30 are rejected in paragraph 5 of the Final Rejection dated December 6, 2006, under 35 USC 102(b) and/or 35 USC 103(a) as being anticipated or in the alternative as being obvious over US 6,361,887 of Shi.

The Examiner relies on Formula (I) of Shi at col. 2/lines 10-33 as reading on the anthracene material of the claims. The material is described by Shi as a polymer meaning it contains at least two repeating groups, "n". Since there are a minimum of seven aromatic carbocyclic rings in each monomeric portion, there must be at least 14 aromatic carbocyclic rings in the polymeric compound. It is interesting to note that Shi description of Formula (I) at col. 2 of Shi does not define "n". At col. 5, line 4, an "n" is defined as from 1 to 6, but this is a different "n" (relating to the "X" linking group at the bottom of col. 4) and so is not relevant. The only place that "n" in formula (I) appears to have been described is in the claims where it is stated that "n is greater than 1". Since it is axiomatic that polymers, by definition, contain repeating groups, it is clear that "n" must be selected in multiples greater than 1 or, in other words, it must be at least 2.

Accordingly, there must be at least 14 aromatic carbocyclic rings which exceeds the claim limitation. If one reviews the monomers depicted in columns 7-38 of Shi, it is clear that the number of carbocyclic aromatic rings in just one of the monomeric groups can exceed 15 giving 30 rings minimum in total. Thus, there is no anticipation of claim 1 or any of the claims dependent thereon.

The Examiner fails to appreciate the fact that Shi is teaching a polymeric material and the fact that the formulas shown throughout Shi represent only the formula for one monomeric repeating group. When repeated (n>1), the number of aromatic carbocyclic rings will multiply by at least two. Thus, the host of Shi is readily distinguished from that of the claimed invention.

Shi suggests components to the Host material that include substituents "X" and "Y" that are bound into the host and can emit. In the top of col. 23 of Shi there is shown a perylene type substituent of the anthracene compound; but since the shown formula is only a repeating monomer, there are (7+5) x 2 or at least 24 aromatic carbocyclic rings, far from the 12 of the claimed invention. Even when Shi also suggests the inclusion of added emitting material, it does not alter the distinction in the host materials.

The molecular weight and number of carbocyclic rings is important to the claimed invention. Desired vapor deposition of materials cannot be achieved when there are too many rings. As the molecular weight rises, the temperature needed to vaporize the material exceeds the temperature at which the organic material remains stable and the material is destroyed. The Shi reference is readily distinguished from the claimed invention by the presence of a polymeric material for which vapor deposition is not possible. Note that in the only device example of Shi (Ex 21 at col. 53) the anthracene material is applied via spin-coating in step (b) as typically used for polymers. Although the specific polymers and "n" values are not specified, one can take the smallest molecular weight value of 9,270 for compound 44 in Table 1 in col. 54 of Shi and divide it by the approximate weight of a single monomer or repeating group (=868 from formula for monomer formula 44 at col. 12) to arrive at 11 repeating groups x 11 rings per monomeric group = 121 rings, far in excess of the 12 rings allowed in the present claims.

Not only do the claims under appeal not read on the Shi reference, they are not obvious over Shi. Shi employs a polymeric technology in which an emitter is incorporated into the polymer rather than having an emitter dispersed within a predominant host as a separate component. Shi's material could not be vapor deposited and the present material could not be spin-coated to form the OLED device. There is no reason to expect that one of ordinary skill in the art would arrive at the presently claimed small molecule invention from the polymeric teachings of Shi. One skilled in the art would not expect a polymeric material to behave like its monomeric starting material due to changes in bond types and molecular weights. Consider how much different polyethylene film is from the unsaturated ethylene from which it is prepared.

The Examiner asserts that one of ordinary skill in the art would, from Shi Formula (I), immediately envisage the R group in the 2-position being a monocyclic phenyl group, a naphthyl group of a biphenyl group. Again, the Examiner ignores the "n" multiplier in the Formula (I) which is essential to the material being a polymer as taught.

There is not one compound taught by Shi that is within Appellant's claims nor that renders the claimed invention obvious. One can assume for discussion that the behavior of the individual molecular material can be reliably predicted from the behavior of the polymeric. Then, the comparative non-polymeric compound in the present examples, (TBADN) is an anthracene having a tertiary butyl (t-butyl) group in the 2-position of the anthracene molecule, and a review of the data in the application shows clear superiority of the invention over the t-butyl analog with respect to yield, color and stability. On the other hand, many of the specific polymeric compounds proposed by Shi contain a t-butyl group as R_1 in the 2-position of the anthracene. See Examples 3, 6, 21, 24, 27, 28, 34,39, 43, 44, etc. The lack of common effect of the t-butyl analog confirms the lack of predictability.

2. Claims 25-27 are rejected in paragraph 6 of the Final Rejection under 35 USC 103(a) as being obvious over Shi above in view of US Publication 2002/0027416 of Kim.

This rejection is based on the combination of the asserted teachings of Shi, above, in combination with those of Kim regarding employing a blue emission and a yellow emission to achieve a white emission. This combination rejection fails for the reasons stated above with regard to Shi. Since neither Shi nor Kim anticipates nor renders obvious the use of a host as claimed, the combination with the second emitter of Kim for the purpose of emitting white light would not be obvious.

Conclusion

For the above reasons, Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the rejection by the Examiner and mandate the allowance of all claims under appeal.

Respectfully submitted,

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Enclosures

If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.

Appendix I - Claims on Appeal

1. An electroluminescent device comprising a light emitting layer including as a host an anthracene material bearing at least one aryl ring in the 2-position and having a hydrogen or an alkyl group in the 6-position and having up to 12 aromatic carbocyclic rings including at least one naphthalene group in the 9-position of the anthracene group and an aryl group in the 10-position, the anthracene material including among the rings only carbocyclic rings, and including a light emitting material in an amount of up to 15 vol.% of the host.

3. The device of claim 1 wherein the anthracene material comprises at least one 2-naphthyl group.

4. The device of claim 1 wherein the anthracene material comprises independently selected naphthyl groups in the 9- and 10-positions.

5. The device of claim 4, wherein the naphthyl groups are independently selected 2-naphthyl groups.

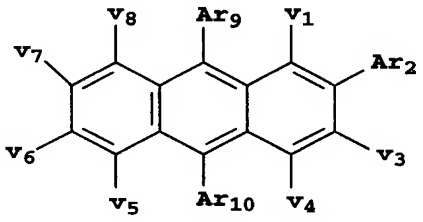
6. The device of claim 4, wherein the naphthyl groups in the 9- and 10-positions are the same groups.

8. The device of claim 1, wherein the 6-position of the anthracene material bears a hydrogen.

9. The device of claim 1, wherein the aryl group in the 2-position is a monocyclic phenyl group, a naphthyl group or a biphenyl group.

10. The device of claim 1, wherein the anthracene material comprises only one anthracene moiety.

12. The device of claim 1, wherein the anthracene material is represented by Formula (1),



(1)

wherein:

Ar_2 represents an aryl group;

Ar_9 represents a naphthyl group;

Ar_{10} represents an aryl group,

v_1, v_3, v_4, v_5, v_7, and v_8 independently represent hydrogen or a substituent;

v_6 represents hydrogen or an alkyl group.

13. The device of claim 12, wherein Ar_9 and Ar_{10} represent independently selected naphthyl groups.

15. The device of claim 12, wherein v_6 represents a hydrogen.

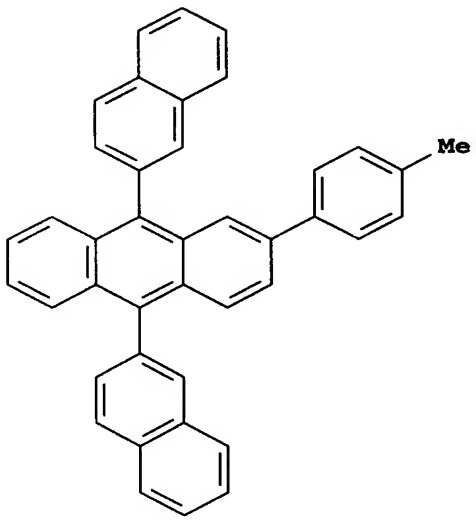
17. The device of claim 12, wherein Ar_2 represents a monocyclic phenyl group.

18. The device of claim 1, wherein the light-emitting layer includes a blue or blue-green light-emitting material.

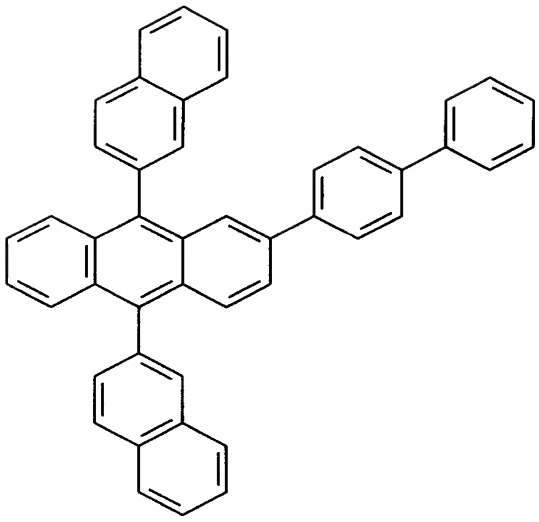
21. The device of claim 1, wherein the light-emitting layer includes perylene or a derivative of perylene.

24. The device of claim 1 wherein the anthracene material is selected from the following.

Inv-1



Inv-2



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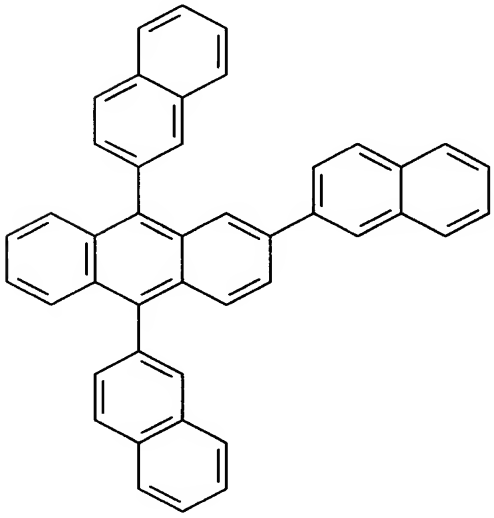

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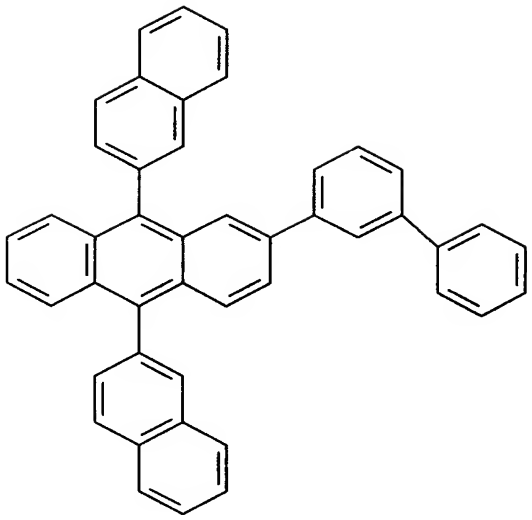

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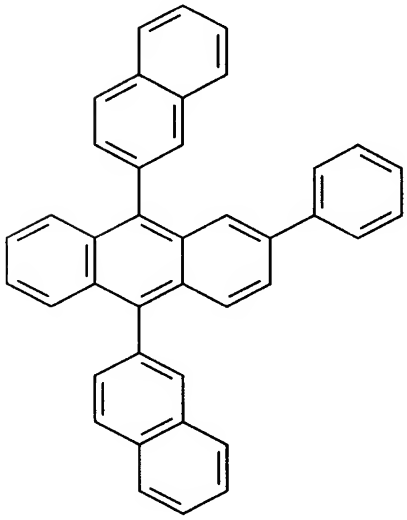

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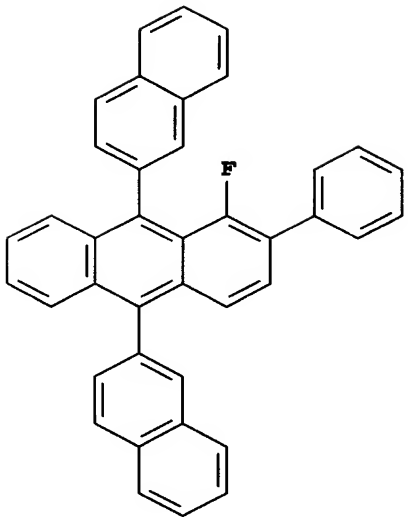

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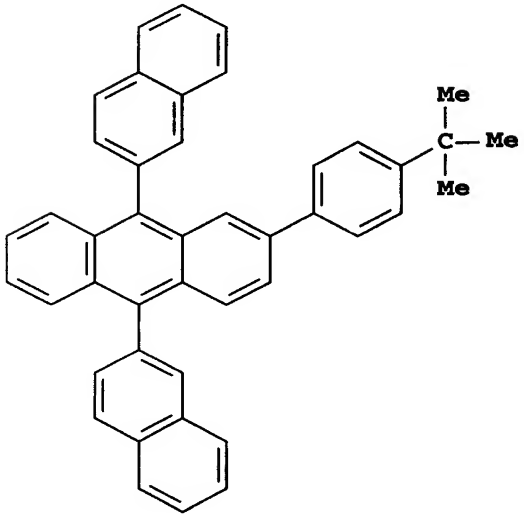

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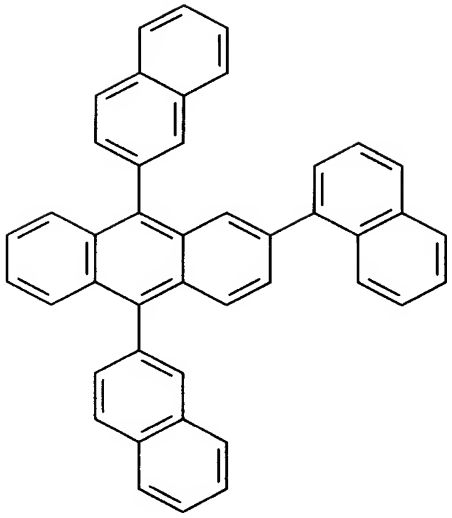

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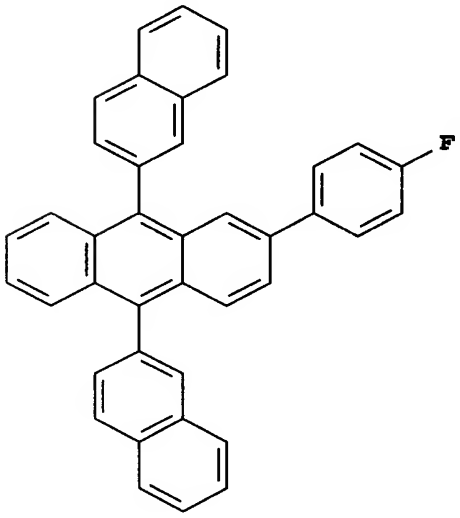

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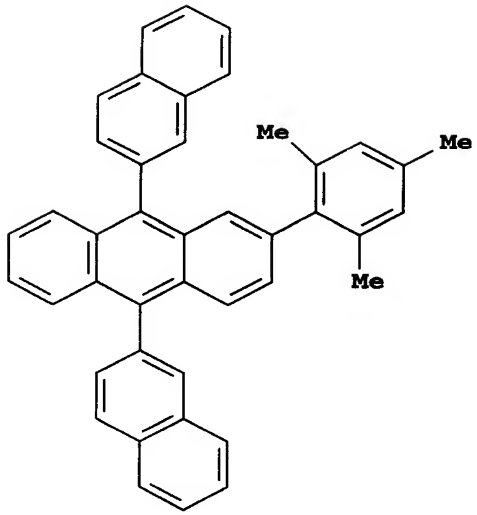

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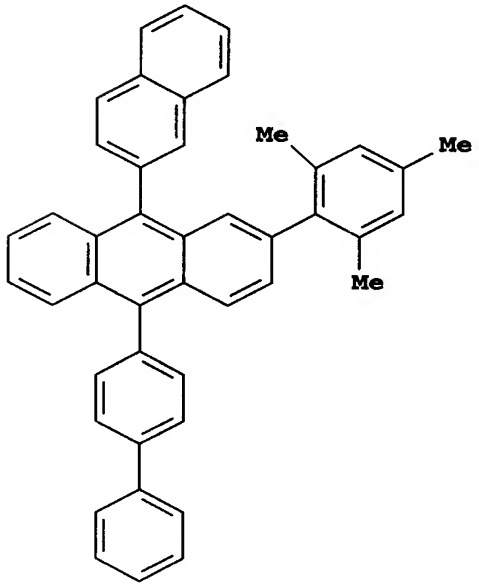
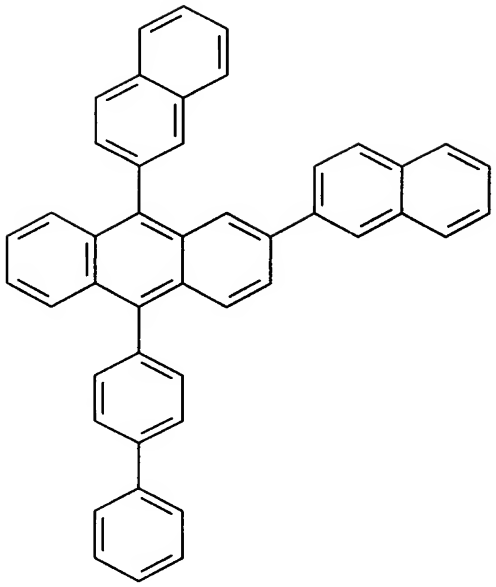


Inv-12



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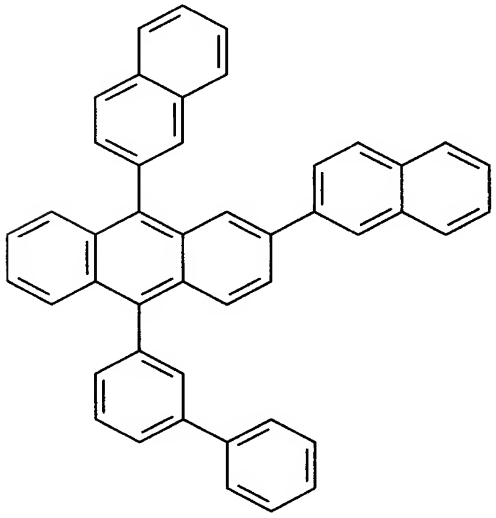

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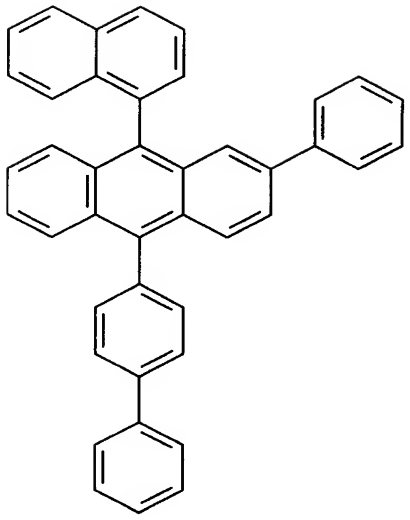

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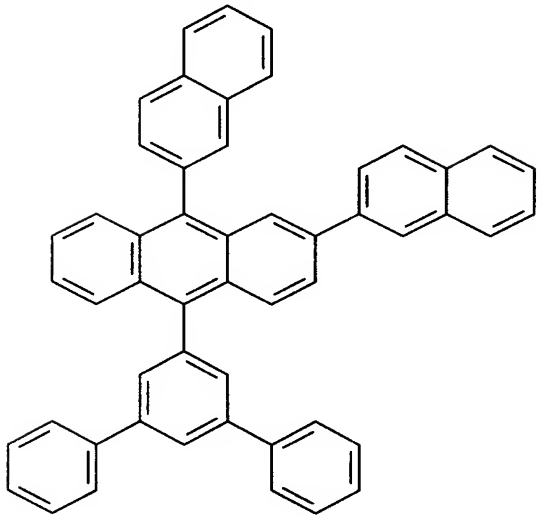
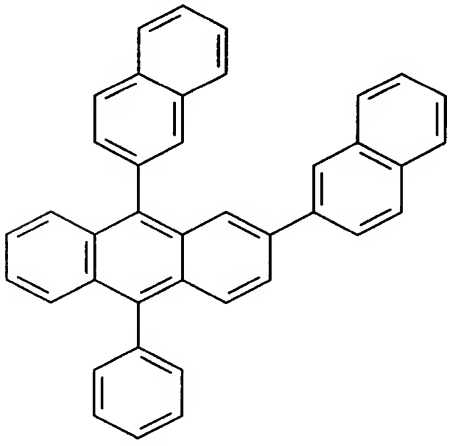


Inv-16



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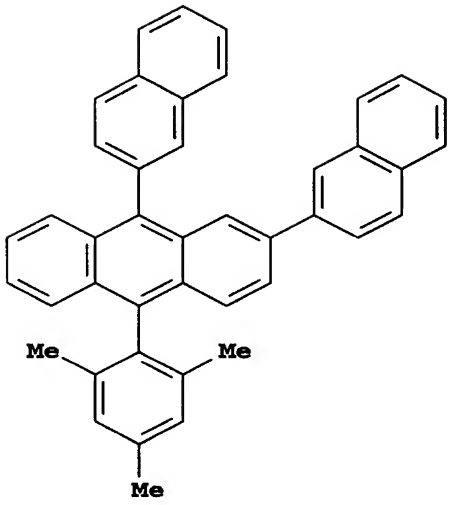

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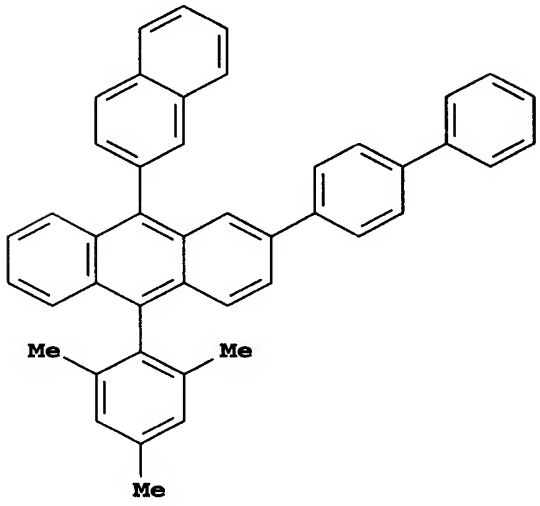

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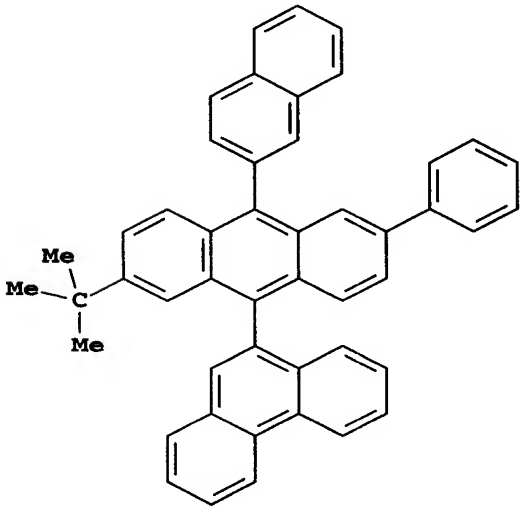

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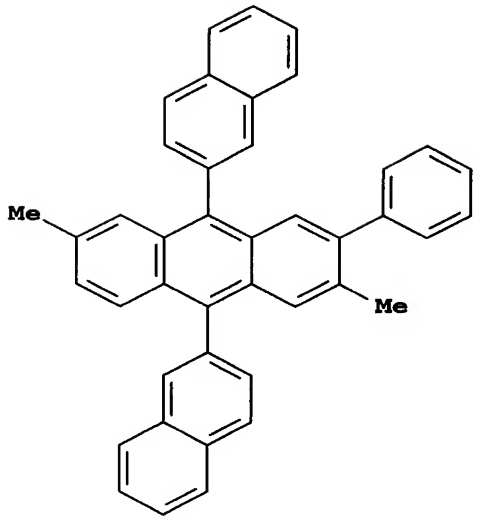

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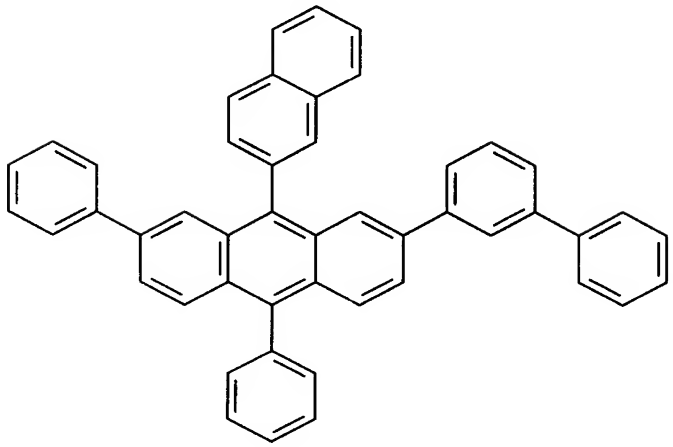

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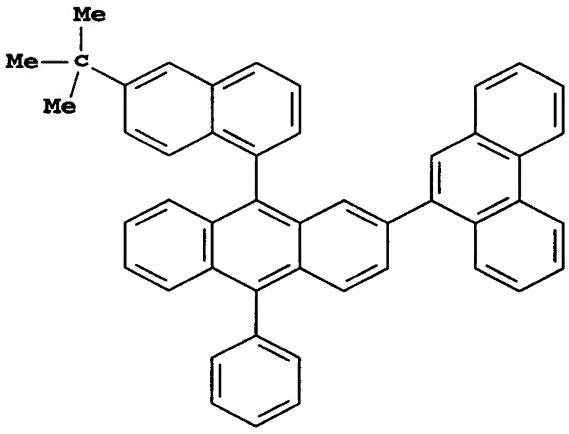

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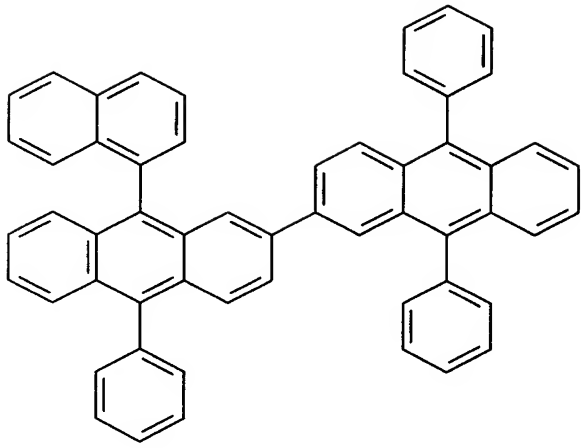
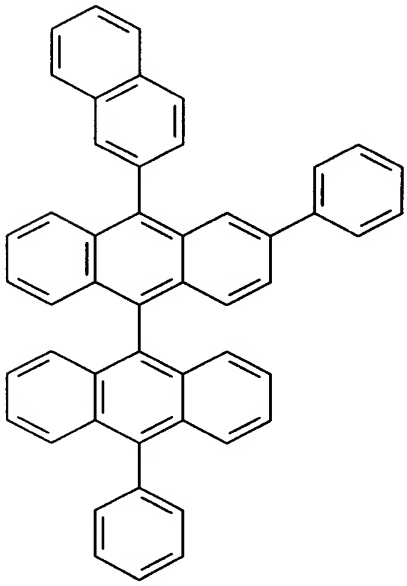


Inv-24



25. The device of claim 1, further comprising a second light-emitting layer to provide a white light emission.

26. The device of claim 25, wherein the second light-emitting layer comprises rubrene or a derivative of rubrene.

27. The device of claim 1 wherein white light is produced either directly or by using filters.

30. A process for emitting light comprising applying a potential across the device of claim 1.

Appendix II - Evidence

None

Appendix III – Related Proceedings

None